

REMARKS

This Application has been carefully reviewed in light of the Office Action mailed November 23, 2009. At the time of the Office Action, Claims 1-20 were pending in this Application. Claims 1-20 were rejected. No Claims have been amended. Applicants respectfully requests reconsideration and favorable action in this case.

Rejections under 35 U.S.C. § 102

Claims 1-6 and 14-18 stand rejected by the Examiner under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,057,734 issued to Naoyuki Tsuzuki et al. ("*Tsuzuki*"). Applicants respectfully traverse and submit the cited art does not teach all of the elements of the claimed embodiment of the invention.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). Furthermore, "the identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co. Ltd.*, 868 F.2d 1226, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). Applicants respectfully submit that the cited art as anticipated by the Examiner cannot anticipate the rejected Claims, because the cited art does not show all the elements of the present Claims.

As a preliminary matter, it is relevant to note that the background of the invention teaches that it is known in the prior art that during opening and closing of the valve the piezoelectric actuator is initially recharged with a first boosting charge with a maximum gradient and thus executes a partial stroke. After recharging interval of a predetermined time period, the piezoelectric actuator is then charged in the same direction with a second partial charge on the final stroke, whereby the gradient of the second partial charge is less than the maximum gradient of the first partial stroke. (Sub Spec at ¶ 0007). Tsuzuki et al. discloses a system similar to that described in the prior art wherein it is a two stroke system. A difference between the prior art and the invention is that the prior art does not provide for the first or second strokes to be adjusted.

Claim 1 recites “dependent on the waveform of a voltage at the piezo actuator or a current through the piezo actuator which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration, ***adapting the holding time duration and/or the first discharging duration in order to ensure precise control of the valve.***” (emphasis added). Similarly, but relative to a charging process, claim 2 recites “dependent on the waveform of a voltage at the piezo actuator or a current through the piezo actuator which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration, ***adapting the holding time duration and/or the first charging duration in order to ensure precise control of the valve.***” (emphasis added). Claim 14 recites, “dependent on the waveform of a voltage at the piezo actuator or a current through the piezo actuator which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration, ***means for adapting the holding time duration and/or the first charging duration in order to ensure precise control of the valve.***” (emphasis added)

According to the Sub Spec,

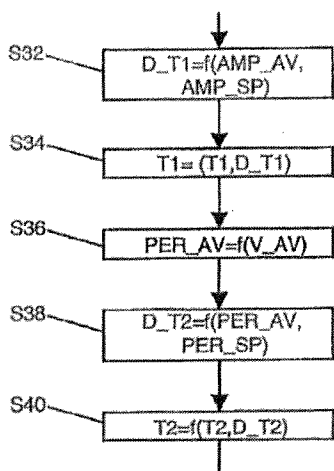
The holding time duration and/or the first discharging duration is/are adapted according to the waveform of a variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration. By the means, pressure oscillations which occur as a result of the release of the valve seat in a fluid that is flowing through the valve ***can also easily be greatly dampened under different types of operating conditions of the valve.*** In addition, noise emissions can thus also be simply reduced.

The variable is preferably the amount of energy which is discharged from or fed to the piezo actuator, or the voltage which drops at the piezo actuator, or the current which flows through the piezo actuator, or the charge stored in it.

(Sub Spec at ¶¶ 0009-0010) (emphasis added). “The holding time duration and/or the first charging duration is/are adapted according to the waveform of a variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration. By this means, bouncing on impact can also be easily reduced ***under different types of operating conditions of the valve.*** (Sub Spec at ¶ 0011) (emphasis added).

With reference to Figure 3, the control of the charging process is described, wherein at step S32 a correction value D T1 for the first charging duration T1 is ascertained dependent

on the actual value AMP_AV and setpoint value AMP_SP for the amplitude. (Sub Spec at ¶ 0044).



(Sub Spec, Figure 3). At Step S34, a corrected first charging duration T1 is then ascertained dependent on the charging duration T1 and the correction value D_T1 for the first charging duration. (Sub Spec at ¶ 0045). At Step 38, a correction value D_T2 is then ascertained for the holding time duration dependent on the actual value PER_AV for the period and on a setpoint value PER_SP for the period. (Sub Spec at ¶ 0047). In Step 40, a corrected holding time duration T2 is then ascertained dependent on the holding time duration T2 and the correction value D_T2 for the holding time duration. (Sub Spec at ¶ 0048). Thus, the Sub Spec clearly supports a step of *adapting the holding time duration and/or the first charging duration in order to ensure precise control of the valve*, as claimed in the claims.

A premise of the rejection of the claims 1, 2 and 14 is that this claimed “adapting” step is disclosed by Tsuzuki, wherein the rejection states “the holding time duration and/or the first discharging duration is adapted in order to ensure precise control for the valve (i.e. dependent on the LC oscillation circuits and controlling the valve without bounce, Col. 13, Lines 1-30).” (OA at 3). However, the premise fails because Tsuzuki teaches that “when a *predetermined time such as 200 μs has passed*, so that the valve member 67d reaches the periphery of the valve seat 67b, the second-stage valve closing ignition signal S₁' is generated, to turn ON the thyristor 1051b.” (Tsuzuki at 12:66-13:2). In the illustrative embodiment, Tsuzuki teaches that the first stage lasts for 200 μs and without any suggestion

that this duration can be adapted or changed. Rather, Tsuzuki teaches that this time period is “predetermined.” (*Tsuzuki* at 12:66). Because *Tsuzuki* fails to teach or suggest varying the time of the first stage and does not even teach a holding time duration, much less varying a holding time duration, the invention as claimed in claims 1, 2 and 14 is patentable in view of *Tsuzuki*. The invention as claimed in claims 3-6 and 15-18 is patentable for similar reasons.

The invention as claimed in claims 3 and 15 is independently patentable. Claims 3 and 15 recite, “the holding time duration and/or the first discharging duration or the first charging duration is/are adapted dependent on the amplitude and/or the period of the waveform of the variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration.” By this means, bouncing on impact can also be easily reduced *under different types of operating conditions of the valve*. (Sub Spec at ¶ 0011) (emphasis added). A premise of the rejection of claims 3 and 15 is that

Tsuzuki et al. discloses wherein the holding time duration and/or the first discharging duration or the first charging duration is/are adapted dependent on the amplitude and/or the period of the waveform of the variable (i.e. dependent on the piezoelectric actuator and cycles in microseconds and the LC oscillation circuit, See Col. 13, Lines 1-30) which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration (inherent in a LC oscillation circuit).

(OA at 3-4). The rejection appears to suggest that Tsuzuki et al. inherently teaches the step of “adapting”. Tsuzuki et al. is silent about adapting a hold time duration or a discharging duration, and Applicant disputes that Tsuzuki et al. inherently teaches the step of “adapting.” A hold time is not an inherent characteristic of an LC oscillation circuit. “To serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.” *Continental Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991); MPEP. The rejection cites no evidence that the adapting is an inherent characteristic of an LC oscillation circuit disclosed in Tsuzuki et al.

The invention as claimed in claims 4 and 16 is independently patentable. Claims 4 and 16 recite, “the holding time duration is adapted dependent on the period of the waveform

of the variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration.” By this means, bouncing on impact can also be easily reduced ***under different types of operating conditions of the valve.*** (Sub Spec at ¶ 0011) (emphasis added). A premise of the rejection of claims 4 and 16 is that

Tsuzuki et al. discloses the holding time duration is adapted dependent on the period of the waveform of the variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration (See Col. 14, Lines 40-55, and See Figure 12).

(OA at 4). The rejection appears to suggest that Tsuzuki et al. inherently teaches the step of “adapting” the hold time duration. Tsuzuki et al. does not teach a hold time in the first place, much less adapting a hold time. Tsuzuki et al. is silent about adapting a hold time duration, and Applicant disputes that Tsuzuki et al. inherently teaches the step of “adapting.” A hold time is not an inherent characteristic of an LC oscillation circuit. “To serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.” *Continental Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991); MPEP. The rejection cites no evidence that the adapting is an inherent characteristic of an LC oscillation circuit disclosed in Tsuzuki et al.

The invention as claimed in claims 5 and 17 is independently patentable. Claims 5 and 17 recite, “the first discharging duration or the first charging duration is adapted dependent on the amplitude of the waveform of the variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration.” By this means, bouncing on impact can also be easily reduced ***under different types of operating conditions of the valve.*** (Sub Spec at ¶ 0011) (emphasis added). A premise of the rejection of claims 5 and 17 is that

Tsuzuki et al. discloses the wherein the first discharging duration or the first charging duration is adapted dependent on the amplitude of the waveform of the variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration (i.e. dependent on equations shown on Col. 12, Lines 30-36).

(OA at 4). However, by this disclosure Tsuzuki et al. teaches that the discharging duration or the charging duration are not changeable after the capacitors identified at col. 12, lines 30-36 are selected. Thus, the premise of the rejection fails because Tsuzuki et al. does not disclose adapting the first discharging duration or the first charging duration.

The invention as claimed in claims 6 and 18 is independently patentable. Claims 6 and 18 recite, “the sum of the first charging duration and the holding time duration is limited to a maximum value, which ensures that the valve element is still in contact with the valve seat.” A premise of the rejection of claims 6 and 18 is that

Tsuzuki et al. discloses wherein the sum of the first charging duration and the holding time duration is limited to a maximum value (i.e. modulated in microseconds, Col. 9, Lines 6-15), which ensures that the valve element (20) is still in contact with the valve seat.

(OA at 4). However, by this disclosure Tsuzuki et al. teaches that the sum of the first and second charging durations are limited to a maximum value, but it does not consider a holding time duration.

Rejections under 35 U.S.C. §103

Claims 7-13 and 19-20 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Tsuzuki* in view of U.S. Patent Application Publication No. 2002/0113139 by Nestor Rodriguez-Amaya et al. (“*Rodriguez-Amaya*”). Applicants respectfully traverse and submit the cited art combinations, even if proper, which Applicants do not concede, does not render the claimed embodiment of the invention obvious.

In order to establish a prima facie case of obviousness, the references cited by the Examiner must disclose all claimed limitations. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). Even if each limitation is disclosed in a combination of references, however, a claim composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. *KSR Int’l. Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). Rather, the Examiner must identify an apparent reason to combine the known elements in the fashion claimed. *Id.* “Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal

conclusion of obviousness.” *Id.*, citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). Finally, the reason must be free of the distortion caused by hindsight bias and may not rely on ex post reasoning. *KSR*, 127 S.Ct. at 1742. In addition, evidence that such a combination was uniquely challenging or difficult tends to show that a claim was not obvious. *Leapfrog Enterprises, Inc. v. Fisher-Price, Inc. and Mattel, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007), citing *KSR*, 127 S.Ct. at 1741.

Tsuzuki fails to teach all claim elements because it does not teach a holding time duration much less adapting holding times. Claim 1 recites “dependent on the waveform of a voltage at the piezo actuator or a current through the piezo actuator which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration, ***adapting the holding time duration and/or the first discharging duration in order to ensure precise control of the valve.***” (emphasis added). Similarly, but relative to a charging process, claim 2 recites “dependent on the waveform of a voltage at the piezo actuator or a current through the piezo actuator which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration, ***adapting the holding time duration and/or the first charging duration in order to ensure precise control of the valve.***” (emphasis added). Claim 14 recites, “dependent on the waveform of a voltage at the piezo actuator or a current through the piezo actuator which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration, ***means for adapting the holding time duration and/or the first charging duration in order to ensure precise control of the valve.***” (emphasis added).

According to the Sub Spec,

The holding time duration and/or the first discharging duration is/are adapted according to the waveform of a variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration. By the means, pressure oscillations which occur as a result of the release of the valve seat in a fluid that is flowing through the valve ***can also easily be greatly dampened under different types of operating conditions of the valve.*** In addition, noise emissions can thus also be simply reduced.

The variable is preferably the amount of energy which is discharged from or fed to the piezo actuator, or the voltage which drops at the piezo actuator, or the current which flows through the piezo actuator, or the charge stored in it.

(Sub Spec at ¶¶ 0009-0010) (emphasis added). “The holding time duration and/or the first charging duration is/are adapted according to the waveform of a variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration. By this means, bouncing on impact can also be easily reduced ***under different types of operating conditions of the valve.*** (Sub Spec at ¶ 0011) (emphasis added).

As noted above *Tsuzuki* fails to teach adapting as claimed. *Tsuzuki* teaches that the second stage begins immediately after the first stage and expressly teaches that the first stage lasts for a set time duration. In particular, it teaches that “when a ***predetermined time such as 200 μ s has passed***, so that the valve member 67d reaches the periphery of the valve seat 67b, the second-stage valve closing ignition signal S₁' is generated, to turn ON the thyristor 1051b.” (*Tsuzuki* at 12:66-13:2). In the illustrative embodiment, *Tsuzuki* teaches that the first stage lasts for 200 μ s and without any suggestion that this duration can be adapted or changed. Thus, *Tsuzuki* fails to teach adapting as claimed. Further the rejection does not allege that *Rodriguez-Amaya* teaches “adapting” and applicant confirms that *Rodriguez-Amaya* does not teach “adapting.” Thus, the invention as claimed in claim 7-13 and 19-20 is not obvious in view of *Tsuzuki* and *Rodriguez-Amaya*.

CONCLUSION

Applicants have made an earnest effort to place this case in condition for allowance in light of the remarks set forth above. Applicants respectfully request reconsideration of the pending claims.

Applicants respectfully submit a Petition for One-Month Extension of Time. The Commissioner is authorized to charge the fee of \$130.00 required to Deposit Account 50-4871 in order to effectuate this filing.

Applicants believe there are no other fees due at this time. However, the Commissioner is hereby authorized to charge any fees necessary or credit any overpayment to Deposit Account No. 50-4871 of King & Spalding L.L.P.

If there are any matters concerning this Application that may be cleared up in a telephone conversation, please contact Applicants' attorney at 512-457-2026.

Respectfully submitted,
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